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A Phenothiazine Trial in Calves

An investigation into the possible toxicity of phenothiazine for calves, with observations on an unexpected outbreak of acute parasitic gastro-enteritis

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INTRODUCTION

Phenothiazine has been used for some years in horses and sheep, both experimentally and in general practice, but its use in bovines seems to have been limited and is inadequately described in the literature. Since advanced clinical parasitic gastro-enteritis is not widespread among calves or young cattle, this may account for the dearth of information. Several workers have mentioned the greater possibility of toxic effects occurring in calves as compared with sheep, indicating that further work was needed before advocating the routine use of the drug in bovines.

It may be questioned whether routine dosing of young bovines with an anthelmintic is necessary. In the experience of one of us (J.W.B.) many farms carry calves and yearlings that are unthrifty, and are accepted as such with the excuse that feeding-stuffs cannot be spared for them. Another side to this is that farmers with pedigree herds, and those endeavouring to eradicate tuberculosis, try to rear as many calves as possible, yet lack adequate pasturage. This results in over-stocking and lowered nutrition, conditions which are ideal for the production of a low resistance to infestation with parasitic nematodes.

The nutritional deficiency is difficult to remedy at present, but the good response of these unthrifty animals to dosage with phenothiazine has been remarked upon by the owners. The balance between resistance and susceptibility is delicate in these animals, and removal of the parasitic worms appears to facilitate the full utilisation of the limited food. Many cases like this have been met, which suggests a possible widespread benefit from a more general use of phenothiazine.

These animals seldom exhibit evident clinical symptoms of parasitic gastro-enteritis and faecal egg-counts do not always indicate a heavy worm infestation, suggesting that a sub-clinical infestation might, under certain conditions of nutrition, retard development (if not skeletally, perhaps physiologically, *e.g.*, causing reproductive disorders).

It was in order to investigate some of the above dubious points that a trial was arranged. At its completion it was hoped that the calves could be shown to farmers, and that comparison of the condition of the dosed and control groups would demonstrate visibly the beneficial effect of dosing with phenothiazine.

GENERAL PLAN OF TRIAL

Forty calves, cross-bred Shorthorn type mainly, had been bought when one to six weeks old in the open market. Since then they had been reared on milk and milk substitutes, and had been grazed on clean grass leys, followed by old permanent pasturage. They were nine to twelve months old when first seen, and at no time had they shown any obvious signs of parasitism. The following points were to be investigated:—

1. The therapeutic value of phenothiazine for parasitised calves.
2. The effect of large doses of phenothiazine on parasitised calves.
3. The efficacy of faecal egg-counts as a means of diagnosis.

The faecal egg-counts were carried out at the Veterinary Laboratory, Wye, using the McMaster (Gordon & Whitlock) technique. Abomasal and intestinal (first 15 feet small intestine) worm counts were carried out at Weybridge, through the courtesy of Dr. E. L. Taylor.

Egg-counts are known to be of variable value in assessing the degree of parasitism in sheep, and since the live-weight variation has been shown to be effective in this respect (again in sheep) it was decided to weigh the calves at intervals during this trial, using the market weighbridge for this purpose.

On the first day they were chosen at random, as they came out of the pens, and numbered (ear-tattooed) consecutively (the even numbers to constitute the control, undosed group, and the odd numbers to receive varying doses of phenothiazine).

The phenothiazine used was in powder form, of well-known make, stated by the retail chemist to be 97 per cent. phenothiazine and 3 per cent. wetting agent. It was given as a drench, well shaken up with water.

In order to try to produce a moderate worm infestation in the calves, if initial egg-counts proved to be low, it was arranged to return the animals to the 16 acres of rough permanent pasture (aftermath) grazed by them during the previous two months. The nutritive value of this was judged to be poor, following a dry summer.

The Trial

The dosing, egg-counts, *post-mortem* worm counts and the live-weight changes are given below in chronological order, as recorded.

AUGUST 23RD, 1944 ("D" day).—Commencement of trial. All animals were weighed, numbered (ear-tattooed), and faecal samples taken per rectum. The odd numbers were dosed as follows:—

Odd numbers	1 to 15	... ...	40 grammes.
	17 to 29	... ...	80 "
	31 & 33	... ...	100 "
	35 to 39	... ...	60 "

The calves were in fair store condition. They were returned to the rough permanent pasture pending the results of the faecal egg-counts.

Faecal Egg-counts (Table I).—These showed some degree of worm infestation to be present, but they were generally low, only two samples giving counts of over 600 eggs per gramme (which is usually accepted as evidence of a heavy infestation).

Live Weights (Table III).—The initial weights extended over a wide range in both groups, but each group appeared to be a fairly representative random sample of all the calves. As a matter of interest, tuberculin tests were carried out on all the calves and no reactors were found.

AUGUST 25TH, 1944.—No apparent ill effects from the heavier doses were reported. The egg-counts being low, it was decided to keep the calves on the rough pasture, supplementing it with cabbages fed daily, until dosing and faecal sampling were repeated in about one month's time.

SEPTEMBER 27TH ("D" day + five weeks).—No calves had been reported as being affected by the heavy doses of phenothiazine, but No. 1 had died on September 26th suffering from obvious parasitism. Total worm count 443,000 (see details in Table II). This calf was originally a light-weight animal, also showing a high initial egg-count, which probably accounted for its early death.

The majority of beasts were poor, with many showing symptoms of a staring coat, scouring, emaciation, and a tucked up appearance; these symptoms were not confined to the control group. The owner observed that, in his opinion, the calves should in the normal way have been moved to fresh grazing when this regression was first noticed, about seven to ten days previously.

Faecal egg-counts.—Still low in most cases, but the mean counts were rising, though none adequately reflected the condition of the animals.

Dosage.—All the odd numbers were given a high dose of 40 grammes each (the normal dose for calves of this age was taken to be 25 to 30 grammes).

On this date they were brought into the yards for the winter, as one group, except for six seriously affected animals from each group (marked * in Table I and III), which were removed to another yard, to ensure that they could obtain the food without interference from the others; the diet was the same for all animals —concentrates fed at the rate of 4 lb. per head in view of the generally poor condition of the calves; minerals, hay, kale, cabbages or turnips fed *ad lib.*

OCTOBER 6TH ("D" day + six weeks approx.).—Calf No. 21 died; total worm count 10,400 (see Table II) This calf had been given two doses of phenothiazine, 80 and 40 grammes.

OCTOBER 9TH.—Calf No. 17 was shot, being in a very weak state. Total worm count 282,000. Two doses of phenothiazine had been given, as for No. 21. In view of the rapidly deteriorating condition of most of the calves it was decided to dose at more frequent intervals, *i.e.*, fortnightly.

OCTOBER 17TH ("D" day + seven weeks).—General condition of the animals still very poor: dosed calves could not be distinguished from the controls in this respect. The odd numbers were dosed with 40 grammes each.

Faecal egg-counts.—Mean counts still rising in both groups, but some still low.

The calves had so far displayed little interest in their food, and had at first refused to consume their full ration of concentrates. This may have been due in part to a lack of relish for the diet after a change from grass, or perhaps resulted from anorexia caused by the severe parasitism.

October 19th ("D" day + eight weeks).—Second weighing of all remaining calves (see Table III). This showed that all animals had lost weight except for one control and two dosed calves. The mean loss in the dosed group was approximately 30 lb., that in the control group 58 lb., since weighing on August 23rd. This confirmed that the calves had dropped back considerably, although the difference between the groups is scarcely significant enough to say that dosing had prevented a loss in weight as great as that in the controls.

November 1st ("D" day + ten weeks).—The dosed animals were on the whole improving, whereas those in the control group were now very seriously ill (with the exception of No. 18, a calf which had maintained fair condition throughout, with a consistently low egg-count). On the other hand, there were a few calves in the dosed group which had failed to respond to the continued treatment and were as poor as some of the controls.

Faecal egg-counts.—These had now increased considerably in the controls, compared with the dosed group, although a number in this latter group were high.

Dosage.—The fourth and last dose of 40 grammes was given to each of the previously dosed animals.

November 9th ("D" day + eleven weeks).—The first control calf, No. 26, died. No larvae or immature worms were found on *post-mortem* examination, but there were many adult worms; total count 20,500.

It was decided to end the trial and to dose the control animals in an endeavour to save their lives. Ten of them were given 25 grammes of phenothiazine each and were turned out daily on a clean grass pasture, since there seemed to be a keen desire for fresh grass. Nine other severely affected controls were kept in their yard and given 2 grammes phenothiazine every other day. This latter course was adopted because it was considered unwise to give a full dose to weak calves in case it precipitated death.

(Previous work has demonstrated the effectiveness of repeated small doses of phenothiazine in reducing the faecal egg-count in horses, but it should be noted that this did not indicate a similar reduction in the intestinal worm population. Although reinfestation was prevented, the egg-count rapidly rose to its former level when dosing ceased, whereas it did not do so in horses given a single full dose.—Verbal communication: Dr. E. L. Taylor.)

November 10th.—Three of the above nine control calves were down and too weak to rise (Nos. 22, 24, 34). One dosed animal also was down.

November 21st ("D" day + 13 weeks approx.).—Control calf No. 22 died. Total worm count 13,000. Control calf No. 34 was shot. Total worm count 94,000. The absence of worm larvae and the presence of only a few immature worms in these calves (Table II) was noted.

November 27th ("D" day + 14 weeks approx.).—All remaining animals were re-weighed. Only one calf in the dosed group had failed to gain in weight since the weighing on October 19th, but there were seven (out of 17) animals in the control group which had *lost* weight since then, in spite of the generous diet. Table IV gives a comparison between these weights and the intitial weights on "D" day for both groups.

There was now an appreciable difference to the eye between dosed and control animals, and the difference in the weights of the groups was found to be statistically significant, confirming that dosing had ultimately been beneficial.

November 30th.—The calves were inspected by members of the South Eastern Veterinary Association, and afterwards, a discussion of the trial took place, a special meeting having been called for the occasion.

December 2nd ("D" day + 15 weeks approx.).—Faecal egg-counts were carried out on all the remaining calves, mainly to determine the prevailing condition of the control animals (now dosed). Low counts were observed in every case except Nos. 13 and 24 (No. 24 died a week later).

December 4th.—Those calves in the control group receiving the 2 gramme doses of phenothiazine had not noticeably improved in condition, so a 25 gramme dosage rate was instituted, repeated fortnightly. A good response was made to this in a few weeks, the animals looking brighter in the eye and becoming more lively, though still very thin.

December 9th.—Control calf No. 24 died. Total worm count 15,000.

Table I

Showing the Number of Eggs per Gramme in the Faeces of Calves in both Groups

Dosed

Number	Aug. 23rd	Sept. 27th	Oct. 12th	Nov. 1st
1	600	Died Sept. 26th		
3	–100	200	520	660
5	–100	265	Not taken	200
7	Neg.	330	800	260
9	720	800	126	130
11	–100	200	520	–100
•13	Neg.	665	1,400	1,060
15	–100	Neg.	320	Neg.
17	460	200	Shot Oct. 10th	
•19	200	465	200	600
21	520	130	Died Oct. 7th	
23	320	130	260	Neg.
25	–100	130	520	860
27	–100	1,130	600	200
29	200	200	260	130
•31	–100	–100	Neg.	1,200
33	Neg.	Neg.	660	–100
•35	Neg.	330	–100	1,120
•37	Neg.	1,400	400	660
•39	200	–100	260	720
Means	196·0	356·5	432·8	541·1

Control

Number	Aug. 23rd	Sept. 27th	Oct. 12th	Nov. 1st
2	Neg.	330	200	660
4	200	200	320	–100
6	Neg.	Neg.	460	200
8	200	–100	1,060	260
10	Neg.	865	720	530
12	200	330	460	660
•14	Neg.	200	200	600
16	Neg.	–100	–100	–100
18	260	1,065	Neg.	460
•20	Neg.	400	400	1,600
22	460	265	260	130 Died Nov. 21st
•24	200	600	600	1,800 Died Dec. 9th
26	260	200	260	330 Died Nov. 9th
28	Neg.	265	200	1,260
•30	200	–100	260	Neg.
32	Neg.	530	400	1,120
•34	Neg.	930	1,800	2,720 Shot Nov. 21st
•36	–100	200	200	860
38	–100	400	400	600
40	Neg.	200	660	660
Means	109·0	364·0	448·0	742·0

• indicates calves transferred to Hall Farm on October 19th for special attention.
–100, a count of under 100 (only one egg being seen on a McMaster slide of three cells).

Table II

Giving Worm Counts in the Order of the Deaths of the Calves

Abomasum

Number	Death	Adults	Immature	Larvae	Total
1	Sept. 26th	195,000	133,000	62,000	390,000
21	Oct. 7th	1,000	2,600	6,000	9,600
17	Oct. 9th	94,000	94,000	94,000	282,000
26	Nov. 9th	13,000	Nil	Nil	13,000
22	Nov. 21st	1,800	Nil	Nil	1,800
34	Nov. 21st	75,000	4,000	Nil	79,000
24	Dec. 9th	12,000	—	—	12,000

Small Intestine

Number	Adults	Immature	Larvae	Total	Grand Total
1	9,000	12,000	32,000	53,000	443,000
21	300	400	100	800	10,400
17	1,900	—	300	2,200	284,200
26	7,500	Nil	Nil	7,500	20,500
22	10,600	—	700	11,300	13,100
34	15,000	Nil	Nil	15,000	94,000
24	3,000	—	—	3,000	15,000

In the original worm counts some differentiation into various nematode species was made. For the sake of simplicity these counts have been combined in the above figures. Nematodirus spp. are not included, owing to their relatively low pathogenicity and small numbers. No specimens of *Haemonchus contortus* were found.

TABLE III

COMPARING LIVE WEIGHTS RECORDED ON THREE OCCASIONS

Dosed Groups

No.	Live Weights Aug. 23rd lb.	Live Weights Oct. 19th lb.	Differences in Weight Gains lb.	Differences in Weight Losses lb.	Weights on Nov. 27th lb.	Comparison with Weights on Aug. 23rd Gains	Aug. 23rd Losses	Oct. 19th Gains	Oct. 19th Losses
1	301	Died	—	—	—	—	—	—	—
3	462	392	—	70	480	18	—	88	—
5	420	392	—	28	476	56	—	84	—
7	322	315	—	7	406	84	—	91	—
9	336	329	—	7	378	42	—	49	—
11	343	329	—	14	420	77	—	91	—
*13	301	252	—	49	252	—	49	No change	
15	497	546	49	—	623	126	—	77	—
17	371	Died	—	—	—	—	—	—	—
*19	315	280	—	35	294	—	21	14	—
21	315	Died	—	—	—	—	—	—	—
23	399	364	—	35	511	112	—	147	—
25	399	336	—	63	385	—	14	49	—
27	315	287	—	28	329	14	—	42	—
29	455	476	21	—	602	147	—	126	—
*31	427	343	—	84	350	—	77	7	—
33	371	371	No change		455	84	—	84	—
*35	350	280	—	70	315	—	35	35	—
*37	308	280	—	28	322	14	—	42	—
*39	315	266	—	49	245	—	70	—	21
Totals	7,322	5,838	+70	—567	6,843	+774	—266	+1,026	—21

Av. wt. = 366·1 — Av. wt. = 343·4 — +70 — Av. wt. = 402·5 — —266 — —21

Net loss = —497 — Net gains = + 508 = +1,005

Av. loss = — 29·23 — Av. gains = + 29·88 = +59·1

(over 17 calves) — (each over 17 calves)

Control Group

No.	Live Weights Aug. 23rd lb.	Live Weights Oct. 19th lb.	Differences in Weight Gains lb.	Differences in Weight Losses lb.	Weights on Nov. 27th lb.	Comparison with Weights on Aug. 23rd Gains	Aug. 23rd Losses	Oct. 19th Gains	Oct. 19th Losses
2	392	294	—	98	259	—	133	—	35
4	448	357	—	91	406	—	42	49	—
6	462	448	—	14	518	56	—	70	—
8	476	357	—	119	364	—	112	7	—
10	406	336	—	70	315	—	91	—	21
12	378	336	—	42	343	—	35	7	—
*14	441	364	—	77	336	—	105	—	28
16	350	315	—	35	357	7	—	42	—
18	301	322	21	—	392	91	—	70	—
*20	336	315	—	21	357	21	—	42	—
22	357	294	—	63	Died	—	—	—	—
*24	322	245	—	77	231	—	91	—	14
26	350	280	—	70	Died	—	—	—	—
28	476	371	—	105	434	—	42	63	—
*30	350	280	—	70	259	—	91	—	21
32	420	364	—	56	340	—	80	—	24
*34	406	308	—	98	Died	—	—	—	—
*36	378	371	—	7	469	91	—	98	—
38	413	371	—	42	406	—	7	35	—
40	336	308	—	28	294	—	42	—	14
Totals	7,798	6,636	+21	—1,183	6,090	+266	—871	+483	—157

Av. wt. = 389·9 — Av. wt. = 331·8 — +21 — Av. wt. = 358·2 — +266 — —157

Net loss = —1,162 — Net loss = —605 — +326 = Net gain

Av. loss = —58·1 — Av. loss = —35·58 — +19·1 = Av. gain

(over 20 calves) — (each over 17 calves)

* Indicates calves transferred to Hall Farm on October 19th for special attention.

TABLE IV

A COMPARISON OF THE INITIAL (AUG. 23RD) WEIGHTS WITH THE FINAL (NOV. 27TH) WEIGHTS IN EACH GROUP

Group	Number of Calves showing— Increase in Weight	Loss in Weight	Average Net Change in Weight
Dosed ..	11	6	Approx. 30 lb. gain
Control ..	5	12	Approx. 35 lb. loss

TABLE V

GIVING RESULTS OF THE FINAL EGG COUNTS, ON FAECES SAMPLES TAKEN ON DECEMBER 2ND. THIS TABLE IS INCLUDED AS A MATTER OF INTEREST ONLY, SINCE BY THEN CONTROL CALVES HAD ALSO BEEN TREATED

Number	Eggs per Gramme	Number	Eggs per Gramme
3	Neg.	2	—100
5	Not taken	4	Neg.
7	200	6	—100
9	Neg.	8	Neg.
11	—100	10	200
13	1,200	12	100
15	200	14	200
19	130	16	200
23	260	18	—100
25	460	20	260
27	Neg.	24	1,600 (died Dec. 9th)
29	300	28	130
31	Neg.	30	Neg.
33	200	32	200
35	—100	36	200
37	Neg.	38	400
39	Neg.	40	—100
Mean	121·7	Mean	228·8

DISCUSSION

The unexpected and impressive demonstration of the great dangers from severe parasitic "gastro-enteritis," where young cattle are left for too long in a crowded condition on a piece of land, upset the original plan of the trial, *viz.*, to produce a moderate worm infestation, such as might occur under normal conditions of stock management, then to demonstrate visibly the beneficial effect of dosing with phenothiazine. The observations have been recorded, however, in view of the other points of interest that were met. These are referred to under their various headings:—

Dosage of Phenothiazine.—The dosages of phenothiazine given did not prevent the onset of parasitism, but at the time of the fourth dosing (on "D" day and ten weeks) the dosed calves were visibly better than the controls. At that time two dosings since yarding had been carried out. Heavy doses were given to the calves without apparent ill effects, and doses of 25 grammes were tolerated by even very weak calves and were followed by improvement in condition.

The only doubt about the absolute safety of phenothiazine was raised on September 27th, when it was considered that the dosed animals were perhaps in slightly poorer condition than the controls. Weighing was not carried out to verify this, but the question was raised whether phenothiazine had removed the resistance-provoking factor, *i.e.*, the worms present on August 23rd, and had thus left the calves more susceptible to a massive infestation.

Repeated dosing, in the absence of reinfestation, was presumably necessitated through a considerable proportion of the infestation consisting of immature worms, the result of grazing the infested pasture during the latter part of the period (one month).

Faecal egg-counts.—On "D" day these were not generally high enough to signify a heavy nematode infestation, and although many high counts were observed during the course of the trial, a considerable number failed to reach a significant level. Clinically obvious parasitism was evident by September 27th. This failure of the egg-counts as a diagnostic feature was misleading, in that the severity of the infestation was not fully appreciated until symptoms were well marked. It is evident that, whilst a high egg-count indicates the presence of a large number of worms, a low egg-count might overlook the possibility of large numbers of immature worms or larvae.

Low counts observed just prior to death, or in severely affected animals, may also be due to two other factors; the dilution of the total egg output in the case of animals scouring badly, and the fact that parasites tend to leave their host when it becomes ill, and presumably the environmental conditions in the gut change (Observation by Dr. E. L. Taylor). In the latter case, egg-laying females would be among the emigrants, thus the egg output would be reduced. The dilution factor can be overcome by assessing counts on a dry matter basis, but this was not carried out in this trial.

Worm Counts.—The first death was that on September 26th ("D" day and 4½ weeks) of calf No. 1 (dosed group). On "D" day it had received one dose of 40 grammes of phenothiazine. The abomasal and intestinal counts were extremely high, with the greater proportion composed of immature worms and larvae. *Post-mortem* counts on subsequent deaths revealed a similar picture, but the number of adult worms increased in the later cases. The calves by then were yarded and so not being reinfested, thus allowing only immature worms present at the time of yarding to mature.

The first control animal, calf No. 26, died on November 9th ("D" day and eleven weeks). No immature worms or larvae were found *post mortem*, but there was a heavy infestation of adult

worms. It will be noticed that the previous death, calf No. 21, had occurred on October 7th ("D" day and six weeks) and a fairly large number of immature worms, though few adults, had been found, in spite of the dosing on September 27th ("D" day and five weeks). It can be assumed, therefore, that at some time between these two dates all immature and larval nematodes had matured, *i.e.*, ten to 43 days after yarding the calves. The count on No. 22 confirms this, as does that on No. 34, although in this latter case there was a relatively small number of immature worms still present, though no larvae.

The failure of phenothiazine to expel immature or larval nematodes is evident from a study of the worm counts on the dosed calves Nos. 1, 21 and 17.

Specimens for the worm counts were taken as soon as possible after death and preserved by the addition of formalin. In the case of Nos. 1, 17 and 34, specimens were taken immediately after death. Nos. 17 and 34 were shot, but 12 to 24 hours elapsed between death and *post-mortem* examination in respect of Nos. 21, 22 and 26, each of these dying. The worm counts of all the latter animals are noted to be lower than those of the other calves (which were shot), possibly due to rapid disintegration of worms before specimens were taken.

It is interesting to note that no sign of gastro-enteritis was observed in any *post-mortem* examination.

Live-weight Changes (Table III).—The loss in condition of the calves between "D" day and "D" day plus five weeks was striking, and notably occurred during the latter two weeks of this period. The loss in weight was confirmed by the weighing on October 19th ("D" day and eight weeks) and appeared to continue until November 1st ("D" day and ten weeks), five weeks after yarding the calves and thus the prevention of further reinfestation. Malnutrition may have caused the persistent regression, but a heavy worm infestation was undoubtedly the main cause of the initial inappetence, as a result of which the rations were not fully consumed.

By November 27th ("D" day and 14 weeks) the dosed calves had compensated for their loss of weight, and in twelve cases had gained over their initial weights. Two calves had gained over 1 cwt. in a period of 5½ weeks. Most of the control calves were still losing weight, only five animals showed increase over their initial weights. These controls had been dosed on November 9th to prevent an apparently inevitable total loss of this group.

Conclusions

1. The trial showed, unintentionally, how hyper-acute nematode disease could be produced in a short time under the following conditions: Over-stocking, a low level of nutrition, a period of hot, dry weather followed by rain and heat.
2. Phenothiazine had no effect as a preventive measure when there was a high rate of intake of infective larvae.
3. Repeated dosing with phenothiazine is necessary to overcome a massive infection: at least four doses at fortnightly intervals in infestations where many immature worms occur.
4. Phenothiazine has no deleterious toxic effect on healthy or heavily parasitised calves.
5. Phenothiazine has no effect on immature or larval forms.
6. Phenothiazine, by removing the resistance provoking agent, may make calves more susceptible to a heavy infestation, therefore calves should be removed from infective pasture if there is clinical evidence of parasitic gastro-enteritis.
7. Care must be taken when interpreting egg-counts; *i.e.*, the condition of the animal, the history and area of its pasturage, and the weather, must all be considered before ruling out parasitism merely on finding a low egg-count.
8. There appears to be considerable individual variation in the susceptibility of calves.
9. Stomach worm counts appear to be influenced by the length of time between death and *post-mortem* examination.
10. Veterinary advice in respect of death in calves and yearlings, time for dosing, size of dose and use of pasture, appears to be advisable.

Incidental Observations

1. In calves purchased at a collecting centre, tuberculosis infection may be very low.
2. For *post-mortem* examination purposes it is advisable to destroy the calf by shooting.
3. No *Haemonchus contortus* were encountered in this trial.
4. No lesions of gastro-enteritis were observed in the calves on *post-mortem* examination.
5. All badly infected calves contracted a severe infestation of lice, whereas the dosed and less seriously affected calves remained practically free.

Summary

1. A trial was planned to demonstrate, under normal farm management, the beneficial action and/or toxicity of phenothiazine for yearling calves.
2. Varying doses of phenothiazine (from 40 to 100 grammes) were given with no untoward effect.
3. Certain concurrent conditions of management, nutrition and weather gave rise to a severe and acute parasitic gastro-enteritis.
4. This was not prevented by dosing with phenothiazine.
5. Faecal egg-counts failed to indicate heavy infestations, which were only revealed by *post-mortem* worm counts.
6. Variations in individual susceptibility were found.
7. The dosed calves eventually progressed better than the controls, as judged by eye and by their weight gains.

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ABSTRACTS

[Control of Leptospirosis in War Dogs. Jones, T. C., Roby, T. O., Davis, C. L., and Maurer, F. D. (1945.) *Amer. J. vet. Res.* **6**. 120-128.]

A plan for the control of canine leptospirosis was developed at a War Dog Reception and Training Centre. This report covers the results of the operation of that plan over a period of 17 months.

Serum from each new arrival was tested by the macroscopic agglutination test, and each animal was quarantined for at least two weeks. All reactors to the test were destroyed. Of a total of 4,368 dogs, 58 gave positive and 136 gave suspicious reactions, the total incidence of reactors being 4·44 per cent. The comparatively low incidence of reactors is attributed, among other things, to the facts that most of the animals were young, and only apparently normal dogs were tested (with a few exceptions). Detailed *post-mortem* examinations were carried out on reactors, and efforts were made to recover the infecting organisms in some cases.

All animals showing clinical symptoms suggestive of leptospirosis and giving positive reactions to the agglutination test were immediately slaughtered and autopsied. Constant vigilance was maintained for early recognition of such cases. The signs of acute leptospirosis usually encountered were jaundice, subcutaneous or gastro-enteric haemorrhages, acute prostration, fever, or acute nephritis.

Fifty-one dogs were autopsied, three of which had shown symptoms of leptospirosis. These three showed the usual lesions of the acute disease. An almost constant finding in the asymptomatic cases was kidney damage. Usually the kidney capsule was pale and adherent, and small areas of congestion showed through it. The cut surface of the kidney showed lesions varying from small grey or yellowish foci to extensive infiltrations, usually situated in the cortex. These were composed of aggregations of lymphocytes, plasma cells, monocytes and, less often, polymorphonuclear leucocytes, usually occurring interstitially, and causing displacement of the tubules and glomeruli. Scattered pin-point haemorrhages were also seen. These kidney lesions appear to be highly specific.

Leptospira canicola was isolated in culture from three animals and leptospirae were demonstrated microscopically in the lumen of the tubules in six cases (but not in any of the three kidneys from which organisms were recovered in culture).

This control plan, based on the elimination of actual and potential sources of infection, appears to be quite effective.

I. W. B.

* * * * *

[Granulosa-cell Tumour of a Bovine Ovary. Langham, R. F., and Clark, C. F. (1945.) *Amer. J. vet. Res.* **6**. 81.]

A Holstein-Friesian heifer developed marked symptoms of nymphomania, and when slaughtered it was found to have a granulosa-cell tumour of the right ovary: it is possible that the tumour cells had secreted an oestrogenic substance responsible for the nymphomania. The tumour was large (18 × 14 × 8 cms.), well encapsulated, and showed on section a lobulated appearance, being composed of a soft and very vascular tissue.

E. C.

CLINICAL COMMUNICATION

Preparation of Penicillin and its Veterinary Application

Preliminary Experiments

ZAKI MORCOS, M.V.SC., F.R.C.V.S., D.V.H. (ENG.)
PROFESSOR OF BACTERIOLOGY, CAIRO VETERINARY COLLEGE

Origin of Penicillin Culture and Titration.—The O.C. of a Base Hospital, M.E.F., was kind enough to supply me with the culture and estimate the units of the product which was used in estimating the units of successive further preparations. I am also greatly indebted to Mr. J. J. R. Hindle, of the R.A.V.C., M.E.F., for his great assistance and for his observations of many of the cases following.

Due to lack of equipment and accommodation, no more than four litres of media could be used at a time. Naturally at such a rate dry powdered penicillin could not be prepared and on extraction the penicillin ether was added to warm diluted water in a glazed earthenware basin; stirred almost constantly to avoid adherence of penicillin to the walls of the basin. On evaporation of ether the solution was filtered through a Seitz filter, collected aseptically, and titrated as well as tested to ensure absence of contaminants. Glucose was substituted by ordinary sugar or 20 per cent. sterile solution of molasses in distilled water. Both answered equally well.

Through the following experiments the fine penicillin used was titrated to contain 6,000 units per c.c.

Cattle Plague Virus

Experiment (1):

Through the kind permission of the Director, Veterinary Service, Ministry of Agriculture, fine penicillin was tried on rinderpest virus.

Calf No. 120, eleven months old, was inoculated with virulent blood and on the third day, at the beginning of the rise of temperature, the calf was inoculated subcutaneously with 5 c.c. fine penicillin three times a day—that is about 30,000 units per dose. The temperature, however, continued to rise and on the evening of the sixth day the calf was bled to death.

Temperature of calf 120 on V.B. inoculation 38·2° C.

1st day,	M. 38·2° C.	E. 38·3° C.
2nd day,	M. 38·0° C.	E. 38·2° C.
3rd day,	M. 38·8° C.	E. 40·1° C.
4th day,	M. 40·1° C.	E. 40·2° C.
5th day,	M. 40·2° C.	E. 40·9° C.
6th day,	M. 40·8° C.	E. 41·0° C. Bled to death.

CONTROL: Calf No. 119, nine months old, inoculated with virulent blood only and no penicillin administered, showed almost the same reaction and was bled to death for virulent blood production on sixth day.

CONCLUSION: Penicillin *did not have any effect on cattle plague virus in this experiment.*

Experiment (2):

At various stages of strangles, penicillin was intramuscularly administered. In all the following cases 10 c.c. of about 60,000 units were inoculated thrice daily for *three days* only and complete recovery resulted.

CASE (A): A three-year Arab grey horse, both submaxillary and parotids suppurating—animal off food. Other abscesses, small, along near side jugular course. Complete recovery.

CASE (B): Dark Bay four-year Arab horse, both submaxillary indurated; about seven times normal size. Fairly profuse nasal discharge. Within three days glands became normal and discharge stopped.

CASE (C): Valuable five-years-old steel iron grey Arab. Swelling of the whole of the intermaxillary space and difficulty in breathing. The animal became normal after three days and by the time the veterinary authorities inspected the horse, the lesions had disappeared. Some of my colleagues tried this penicillin in similar cases and reported favourably.

CONCLUSION: Penicillin seemed almost specific in the treatment of strangles in horses.

Fowl Plague Virus

Experiment (3):

Three chicks three months old were intramuscularly inoculated with 0·1 c.c. each defibrinated V.B. of fowl plague and were inoculated at the same time with 0·5 c.c. and doses repeated every four hours, but the three chicks died on the fourth day, with oedema of the head and hyperaemia of the skin.

RESULT: Penicillin did not cure fowl plague in this experiment.

Pneumonia in Sheep

Experiment (4):

Most of the cases encountered were associated with diphtheroid bacilli. The disease took an epizootic form. Young sheep suffered most. Administration of 1 c.c. fine penicillin four times daily for three days ended in complete recovery of five cases. Temperature (105° F.) dropped to normal following day and sheep were again feeding. One sheep was killed ten days after treatment: lesions completely healed up with only scars remaining.

RESULT: In such an epizootic type of pneumonia in sheep, penicillin seems most promising.

Epizootic Lymphangitis

Experiment (5):

Two cases, clinically epizootic lymphangitis (confirmatory laboratory diagnosis was not available) each received 5 c.c. fine penicillin every four hours intramuscularly and ulcers healed up after four days. Further experiments are essential before a statement can be made.

Pyelonephritis

Experiment (6):

I have had six cases of this condition in the past few months, all showing the same symptoms of mild colic, weakness in the hind limbs, subnormal temperature at first, rising gradually to 104 to 105° F., poor appetite. In most cases frequent urination with a little straining. I made a *post-mortem* examination on four of these cases and found exactly the same lesions in all—marked nephritis with quite a lot of pus in the cortex and tubules which was easily squeezed out. In one case the pus showed only in one kidney but the other was inflamed. The livers were very congested. The bladders contained a little pus which presumably caused the slight straining. I destroyed all four animals when they were no longer able to stand and showed marked anaemia. The fifth case recovered naturally but took a very long while and was very debilitated at the finish: I had to send it away to hospital, the animal was so thin and showed no sign of putting on any weight. The sixth case I treated with penicillin (5 c.c. T.I.) for two days. This animal recovered completely and was quite normal by the end of a week. It lost no flesh at all. The temperature, subnormal at first, returned to normal in two days.

As laboratory diagnosis was not available, I am unable to specify the causative organism, but it was definitely pus-producing.

Fowl Spirochaetosis

Experiment (7):

Six three-months-old cross Leghorn chicks inoculated with *Spirochaeta gallinarum* (blood films +) were inoculated every four hours with fine penicillin ½ c.c. per one pound body-weight for four successive days.

RESULT: Blood remained positive and no cure.

Miscellaneous

Various fistulae and wounds and mastitis due to Gram + organisms healed up after four days on intramuscular inoculation of fine penicillin every four hours.

Summary

Penicillin certainly has a markedly curative effect in the majority of animal diseases due to Gram + organisms: it is specific in strangles and promising in epizootic lymphangitis. It appears, however, to be ineffective in virus diseases and fowl spirochaetosis.

PATHOGENIC FUNGI SUBSTITUTES FOR *PENICILLIUM NOTATUM*

Penicillin-like antibiotic substances have been isolated from fungi of the genus Tricophyton, Epidermothyton, and Microsporon by surgeons of the U.S. Public Health Service. Among the species investigated were the *T. mentagrophytes, T. tonsurans, T. rubrum, Epidermophyton floccosum, Microsporon canis,* and *M. audouini.* The presence of antibiotic substances in *Aspergillus fumigatus* had been noted previously. A detailed study of various strains of *T. mentagrophytes* isolated from clinical lesions of dermatomycoses (human) is reported as to technique, spectrum of action, stability, and microbicide property. The microbicide factor disclosed was similar to penicillin in respect to its production on mediums containing cornsteep liquor, the spectrum of activity, the behaviour toward organisms that resist penicillin, sensitivity to temperature and *p*H, and destruction by clarase. The varieties studied were obtained from lesions of the foot, scalp, upper lip and beard. Strains from animals (squirrel and monkey) cultivated in the same manner did not produce any antibiotic substance.—Public Health Reports, February 9th, 1945. Abstracted in *Veterinary Science News Letter.*

REPORT

[**Nigeria.** Annual Report of the Veterinary Department for the year 1942.]

"The results of the campaign against epizootic diseases which the Department has been carrying on successfully for the past 20 years are rapidly becoming apparent. Schemes for livestock improvement and the development of industries connected with livestock have been made possible only by the success of this campaign and the war has provided the stimulus necessary to bring such schemes into being. Everywhere throughout the northern provinces one hears talk of development; development in the north is bound intimately with agriculture which in its turn is bound likewise to livestock farming; the one is essential to the other and the two must go hand in hand.

"Without effective disease control and prevention and the research connected therewith, however, livestock farming would be predestined to failure."

The above remarks abstracted from the summary of this report by Mr. W. W. Henderson, C.B.E., Director of Veterinary Services, might have been written about almost any of the British possessions under control of the Colonial Office and reveals a most peculiar state of affairs. Knowledge alone of existing conditions is not sufficient to provide the stimulus necessary to bring about the most obvious developmental requirements recommended by technical and professional departments—*a major war appears to be necessary to provide the desired stimulus.*

Diseases of Cattle.—Rinderpest (cattle plague), trypanosomiasis, contagious bovine pleuro-pneumonia, anthrax, blackquarter and foot-and-mouth disease receive specific mention and control measures generally appeared to be giving satisfaction.

The use of attenuated goat virus (introduced the previous year) appeared to be accepted as a most useful advance in control measures against rinderpest. This simple immunological method, originating in India, had already proved very successful in control work in East Africa and the major limiting factor to its more widespread use appeared to be difficulty in obtaining the special desiccator apparatus for its production in readily portable and viable form.

Rapid increase of land under cultivation (presumably for cash crops) thus driving cattle into the tsetse areas, accounted for the apparent increased incidence of trypanosomiasis—a condition of affairs which could have been obviated to a great extent by the use of the more arid areas of good open pasture land already existing and unsuitable for agriculture, but, through neglect, lacking provision for water conservation.

Diseases of Other Animals.—Experiments with sulphapyridine in the treatment of epizootic lymphangitis—the most common equine disease encountered—gave very favourable results. Acetylarsan and soamin were both effective as curative agents for spirochaetosis of poultry—this disease constituting probably the most serious handicap to poultry keepers in Nigeria.

Canine rabies was widespread.

Clinical Work.—With the major epizootics of cattle under control, more time was devoted by veterinarians to actual clinical work and clinics were established at many places throughout the country. These clinics, with increasing popularity, were regarded as likely to become very valuable centres for the dissemination of instruction in animal management and welfare. Facilities had also been provided for the specialised training of Africans to man these clinics and for general disease control work. In addition to over one million prophylactic inoculations for control of epizootics and to mass treatment for trypanosomiasis and helminthiasis, some 17,789 patients were treated at these clinics alone.

Livestock Industries.—Cattle inspected at Trade Control posts numbered 931,464. With increased demand, both local and military, the price of cattle rose to about 50 per cent. above pre-war level. A great improvement in rail transport of livestock was noted and some 47,756 cattle and 14,365 goats and sheep were railed to the south, including 2,405 cattle for export to Gold Coast.

Increased demand for hides and skins prompted a special drive to improve general standards of preparation and increase the volume of the higher grades for export.

Food production schemes instituted by the Veterinary Department both enhanced the quality of and increased production in butter, cheese, ghee (clarified butter fat), pork, bacon and beef. Of special interest was a scheme for fattening selected young zebu stock which, it was found, by proper feeding, could by three years old be brought up to 800 lb. liveweight and after improved butcher methods and hanging (in cold storage) compared very favourably with good English beef. Extension of this scheme on a communal basis was advocated.

S. A. E.

REVIEW

[**Radiology in Canine Practice.** By Gerry B. Schnelle. The North American Veterinarian, Inc., Evanston, Illinois, 1945. Price $5.]

This is a text-book which should go a long way to satisfy the hopes of the small-animal practitioners that someone would produce a book which would not only help them in their X-ray technique but in interpreting the results thereof. X-rays are still in their infancy in human medicine for there are yet with us those who saw the first skiagraphs of living bone: indeed, in England we of the veterinary profession have one still with us, although now retired, namely H. J. Ede—a radiographer who was in at the start and worked with the pioneers at the London Hospital. Great progress has been made in the intervening years. We have seen the dangerous mysterious machines of yesterday give place to the relatively safe compact machine of to-day which can be worked almost by a novice. To say that X-ray plants can be worked by a novice is literally true, but to produce results which are of useful value entails a high knowledge of anatomy and a skilful and intricate technique.

Dr. Schnelle has endeavoured to enlighten us in these matters and on the whole we can say that he has gone a long way towards that goal. He has made full use of the wealth of material which he has at hand and he has not hesitated to consult with his colleagues in human radiology in his search for knowledge. The foreword to the book is from the pen of Dr. Merrill C. Sosman, Professor of Roentgenology of Harvard University.

The work is classified into three sections.

The first deals with basic principles of technique, equipment, exposures and protective measures. This is written in a simple straightforward manner and should be intelligible to anyone versed in elementary physics.

Part II deals with bones and joints and Part III soft tissues, including the viscera.

In the case of the latter two parts details are given as to the technique to be employed and before passing to a discussion of the abnormal conditions which may be portrayed, Dr. Schnelle wisely gives an account of the normal with the requisite illustrations. This is truly a wise step for, when all is said and done, it is the interpretation of the result which matters, for many of us have had the experience of having normal pictures submitted for examination which were supposed to demonstrate something abnormal and *vice versa.*

It is in the interpretation of some of the illustrations that one would criticise Dr. Schnelle. Those who are conversant with X-ray pictures know that the original film is the only worth while thing on which to base a diagnosis. Prints taken from the same, except in the case of gross abnormalities or foreign bodies, are often most unsatisfactory. This well-known fact may account for our divergence of opinion with Dr. Schnelle in some cases and in others our inability to offer any opinion at all on some of the pictures. as, for instance, in the case of Figs. 22, 27 and 76.

Fig. 80 is said to be calcified intervertebral disc: we cannot agree and the subsequent history of the dog supports our contention. Fig. 81 is said to show a calcified slipped intervertebral disc. There is evidence of calcification but position is normal. On page 152 dislocation of the elbow joint comes under review. The author appears to be remarkably successful in resolving this particular dislocation which many of us find one of the most intractable. Dr. Schnelle would do us great service if, in subsequent editions, he would give more details of his methods.

Fig. 43, we would suggest, illustrates a dislocation due to rupture or stretching of the anterior crucial ligament. It is strange that Dr. Schnelle makes no mention of dislocation of the scaphoid or of fracture of the calcis. two conditions which are relatively frequent in this country. Fig. 72, we think, would be better named a "Crushed fracture of the last thoracic vertebra."

These few criticisms, taken at random from a list made when perusing the text, must not be taken as condemnation for they are based on print reproductions and not the original films.

All pioneers have a difficult job and Dr. Schnelle has produced a text-book which gives him great credit and will be a most valuable guide to the small-animal practitioner.

Organised grazing of meadows, leys and their aftermaths, together with controlled calving and well-cooled milk is the foundation of a national milk supply throughout the year. In a herd of 24 cows, the ideal arrangement would be to have eight cows calving from July to September, eight in the next three months and eight from January to March.—*Min. Agric.*

NOTES AND NEWS

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

Sept. 15th.—Applications due for Miss Cust Research Scholarship.
Sept. 18th.—Annual Meeting of the Society of Veterinary Practitioners at Oxford (Randolph Hotel), 2.15 p.m.
Sept. 19th.—R.C.V.S. Committee Meetings.
Sept. 19th.—Meeting of the Western Counties Division, N.V.M.A., at Taunton (Deller's Café), 2 p.m.
Sept. 20th.—R.C.V.S. Committee Meetings.
Sept. 21st.—**R.C.V.S. Council Meetings.**
Sept. 21st.—Meeting of the North Wales Division, N.V.M.A., at Bettws-y-Coed (Memorial Hall), 2 p.m.
Sept. 26th.—Meeting of the Association of Veterinary Inspectors, Conway Hall, W.C.1, 3 p.m.
Sept. 25th-28th.—**N.V.M.A. Annual Meetings, 1945.**
Oct. 4th.—Annual Meeting of the Central Veterinary Society, Conway Hall, W.C.1, 2 p.m.
Oct. 11th.—Meeting of the South-Eastern Division, N.V.M.A., at Tonbrdge (Rugby Football Club, Avebury Avenue), 2.30 p.m.

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N.V.M.A. Annual Meetings

Any members who may still require hotel accommodation during the forthcoming Annual Meetings are strongly advised to write to the General Secretary *at once* for further particulars of the arrangement made with Messrs. Thomas Cook & Sons, who have notified the Association that they cannot guarantee accommodation after Friday, September 21st.

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PERSONAL

Births.—Johnston.—At Castle Bromwich Nursing Home on September 1st, 1945, to Winifred, wife of Thomas Johnston, M.R.C.V.S., D.V.S.M.—a daughter.

Makinson.—On August 15th, 1945, at Camborne, to Jean (*née* Kemp, M.R.C.V.S.), wife of J. B. Makinson, M.R.C.V.S., a sister for Pauline.

Murchison.—At Millbrae Nursing Home, Glasgow, on September 3rd, 1945, to Elizabeth, wife of M. M. Murchison, M.R.C.V.S., Veterinary Officer, Lochmaddy, North Uist—a daughter. Both well.

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R.C.V.S. OBITUARY

Williams, George Herbert, "Rooksway," Malmesbury Road, Chippenham, Wilts. Graduated London, May 22nd, 1891. Died August 31st, 1945; aged 77 years.

Mr. G. H. Williams, M.R.C.V.S.

Mr. Williams, after qualifying, went to Cirencester as assistant to Mr. Blundell. In 1896 he moved to Chippenham and founded the veterinary surgeon's practice in Langley Road, which has, since his retirement, been carried on by his son-in-law, Mr. D. M. Hale, M.R.C.V.S.

A colleague writes of him: "Mr. Williams had been in practice in Chippenham for over 40 years, and built up over a wide area a reputation for professional integrity. Unfortunately his latter years were clouded by chronic asthma, but his wit and intellectual vigour were unimpaired to the end. He will be missed by a wide circle of friends in the profession and in the farming community."

Mr. Williams was a man with a wide variety of interests. In his younger days he was an excellent cricketer and his hobbies included stamp collecting, gardening and painting. He was also something of an authority on inn-signs and the sign outside the "Mermaid" at Christian Malford was executed by him. He had passed through the chair of the local branch of Freemasons.

Deep sympathy is extended to Mrs. Williams and their son and two daughters in their bereavement.

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ADDRESSES OF DISEASE-INFECTED PREMISES

Foot-and-Mouth Disease:

Hunts.—Gore Tree Farm, Hemingford Abbots (Sept. 9th); Houghton Mill Field, Houghton (Sept. 4th); Field Island, The Holmes, Hemingford Grey (Sept. 5th); Rectory Meadow, Wyton (Sept. 6th).

Swine Fever:

Berks.—Pinkney's Farm, Maidenhead (Sept. 7th).
Bucks.—Bisham Allotments, Bisham, Marlow (Sept. 6th).
Cambs.—The Orchard, Coton (Sept. 9th).
Denbighshire.—Cwm Clyd, Tregeiriog, Wrexham (Sept. 5th).
Glos.—The Nook, Parkend, Lydney (Sept. 5th); 9, Valley Road, Cinderford (Sept. 9th).
Hunts.—The Boat Inn, 115, Great Whyte, Ramsey, Huntingdon; New Fen, Ramsey Heights, Huntingdon (Sept. 4th); 55, Council Houses, Ramsey St. Mary's, Huntingdon (Sept. 5th); Dawson's Buildings, Newtown Road, Ramsey; Daintree Road, Ramsey St. Mary's (Sept. 9th).
Kent.—4, Station Road, Withyham, Tunbridge Wells (Sept. 8th).
Lancs.—31, Green Lane, Patricroft, Eccles (Sept. 8th).
Middlesex.—693, Lordship Lane, Wood Green (Sept. 9th).
Midlothian.—"Broomhouse," Broomhouse Road, Corstorphine, Edinburgh, 12.
Norfolk.—Crown House, Wereham, King's Lynn (Sept. 4th).
Northants.—104, Star Road, Peterborough; Severils Farm, Farcet Fen, Peterborough (Sept. 5th); Plantation Farm, Ramsey Road, Whittlesey, Peterborough (Sept. 8th).
Suffolk.—Lane Farm and Whitegate Farm, West Row, Bury St. Edmunds (Sept. 8th).
Warwicks.—Rear of 1-7, Emily Road, Yardley, Birmingham (Sept. 9th).
Wilts.—Manor Farm, Allington, Devizes (Sept. 8th).
Yorks.—Olive Grove Road, Sheffield (Sept. 7th).

Sheep Scab:

Cumberland.—Waskew Head Farm, Tebay, Penrith (Sept. 9th).

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SCHEME FOR THE CONTROL OF DISEASES OF DAIRY CATTLE

Statement showing the Number of Undertakings notified to the Ministry of Agriculture during the Month ended August 31st, 1945

County	Undertakings Notified		Total Undertakings		
	During Month	Previously	Number	Number of Cattle	
				Cows	Heifers
ENGLAND					
Bedford	1	39	40	959	606
Berks	1	94	95	3,273	2,053
Bucks	—	98	98	3,214	1,926
Cambridge	—	12	12	328	192
Chester	2	382	384	12,681	4,578
Cornwall	—	4	4	72	75
Cumberland	—	63	63	1,603	1,359
Derby	3	332	335	9,625	5,484
Devon	2	308	310	4,609	2,752
Dorset	—	67	67	2,101	1,123
Durham	2	279	281	6,162	2,466
Essex	1	244	245	8,665	4,966
Gloucester	—	97	97	2,831	1,670
Hampshire	3	381	384	10,847	7,580
Hereford	—	18	18	339	216
Hertford	—	81	81	2,466	1,532
Hunts	—	13	13	475	302
Isle of Ely	—	2	2	58	29
Isle of Wight	—	14	14	252	127
Kent	2	170	172	4,246	2,605
Lancs	2	195	197	5,739	1,909
Leics.	—	105	105	2,622	1,928
Lincs (Holland)	—	3	3	25	11
Lincs (Kesteven)	—	23	23	320	168
Lincs (Lindsey)	—	108	108	2,067	1,187
Middlesex	—	15	15	611	291
Norfolk	2	189	191	5,757	4,002
Northants	—	82	82	2,299	1,804
Northumberland	—	65	65	2,154	1,210
Notts	3	179	182	3,973	2,422
Oxford	—	45	45	1,237	1,087
Rutland	—	8	8	156	107
Salop	—	259	259	7,685	3,790
Soke of Peterborough	—	1	1	37	31
Somerset	—	246	246	6,508	3,073
Staffs	2	204	206	5,959	3,585
Suffolk, E.	—	88	88	2,096	1,506
Suffolk, W.	—	48	48	994	649
Surrey	1	103	104	3,026	1,428
Sussex, E.	—	178	178	4,472	2,740
Sussex, W.	—	112	112	3,236	1,952
Warwick	—	136	136	3,326	2,163
Westmorland	—	13	13	354	444
Wilts	—	90	90	3,612	1,870
Worcester	2	159	161	3,284	1,650
Yorks, E.R.	1	104	105	1,636	945
Yorks, N.R.	—	117	117	2,373	1,493
Yorks, W.R.	1	251	252	6,141	2,539
WALES					
Anglesey	—	49	49	868	623
Brecon	3	7	10	190	107
Caernarvon	—	110	110	1,721	954
Cardigan	—	29	29	559	393
Carmarthen	4	248	252	4,598	2,407
Denbigh	—	43	43	878	461
Flint	—	114	114	2,545	1,141
Glamorgan	—	105	105	1,728	716
Merioneth	—	9	9	117	55
Monmouth	—	54	54	1,272	713
Montgomery	—	15	15	294	233
Pembroke	—	59	59	1,172	843
Radnor	—	—	—	—	—
TOTALS	38	6,666	6,704	172,447	96,271

Notes.—(1) Operative periods of undertakings: 1 year, 1,284; 2 years, 493; 3 years, 4,927. (2) Undertakings renewed for a further period: 1 year, 1,261; 2 years, 199; 3 years, 328. (3) Undertakings not renewed at end of operative period, 923. (4) The figures showing the number of undertakings notified during the month relate to entirely fresh undertakings and do not include undertakings renewed for a further period. Undertakings which have been cancelled or not renewed are not included in the figures for previous notifications.

County	Undertakings Notified		Total Undertakings		
	During Month	Previously	Number	Number of Cattle	
				Cows	Heifers
SCOTLAND					
Aberdeen	—	22	22	954	332
Angus	—	21	21	838	395
Argyll	—	6	6	113	115
Ayr	—	27	27	880	657
Banff	—	3	3	93	42
Berwick	—	2	2	53	22
Bute	—	—	—	—	—
Caithness	—	—	—	—	—
Clackmannan	—	7	7	301	262
Dumfries	—	14	14	777	719
Dumbarton ..	—	3	3	105	86
East Lothian ..	—	3	3	145	88
Fife	—	34	34	1,272	661
Inverness	—	8	8	324	191
Kincardine	—	3	3	127	83
Kinross	—	3	3	56	40
Kirkcudbright ..	—	14	14	885	642
Lanark	—	19	19	730	549
Midlothian	—	1	1	44	69
Moray	—	—	—	—	—
Nairn	—	1	1	14	—
Orkney	—	—	—	—	—
Peebles	—	2	2	28	16
Perth	—	28	28	687	424
Renfrew	—	7	7	277	201
Ross-shire	—	2	2	58	52
Roxburgh	—	—	—	—	—
Selkirk	—	—	—	—	—
Stirling	—	29	29	925	771
Sutherland	—	5	5	104	76
West Lothian ..	—	1	1	23	18
Wigtown	—	27	27	1,783	1,030
Zetland	—	—	—	—	—
TOTALS ..	—	292	292	11,596	7,532

Notes.—(1) Duration of undertakings: 1 year, 38; 2 years, 10; 3 years, 244. (2) Undertakings renewed for a further period (included in column 2 of statement): 1 year, 41; 2 years, 6; 3 years, 10. (3) Undertakings expired and not renewed (not included in column 2 of statement): 91. (4) The figures showing the number of undertakings notified during the month relate to entirely fresh undertakings.

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WELSH VETERINARY TRAINING

The Welsh Correspondent of *The Times* contributes the following to the issue of that paper's educational supplement of August 25th:—

Dissatisfaction is felt in Wales over the decision of the Loveday Committee that a Veterinary College should not be established there and that Welsh veterinary students must be trained at Liverpool University or Bristol.

Wales is seriously short of veterinary practitioners. There are about 131 practising in Wales, as against 1,414 in England and 357 in Scotland. Increasing importance is now being paid to the care of our livestock. The control of disease, for example, in dairy cows cannot at present be properly developed as there are not enough veterinary surgeons to do the work. Even before the war the output of trained practitioners was inadequate. In the immediate future it is clear that the number of veterinary practitioners in Wales will not be sufficient and that if the care of their livestock is to be adequately met a large supply of veterinary surgeons must be found.

The University Council last year considered the general question of veterinary education in Wales and reported their findings to the University Court. The Council, as was to be expected, were obliged to consider the proposal in relation to the work of the University as a whole and to the most effective use of their post-war funds. They stated that the attractions of the well-established schools at Liverpool and London would probably mean that a veterinary school established in Wales would have to face competition and would, in consequence, be expensive to maintain. They also believed that the absence of a veterinary school need not necessarily handicap Welsh students especially if generous scholarships were provided to maintain them. Finally they suggested that the University of Wales would be "better advised to specialise in the important problems of animal hygiene, nutrition and disease control which are likely to receive special attention after the war and for which the existing facilities at the schools of agriculture in the University should be extended as soon as possible." These views, however, do not necessarily represent those of the Welsh farming community. The National Farmers' Union has decided to support the proposal to establish a veterinary college in the Principality. A conference of Welsh education authorities has recommended that facilities for the training of veterinary surgeons should be provided in Wales and the Council of Agriculture has appealed to the Ministry of Agriculture, pointing out the serious deficiency in the number of qualified veterinary practitioners in Wales and the need for additional facilities for training. A deputation has also been appointed which has interviewed the University Council and the question will certainly be discussed at the next meeting of the University Court.

Wales is a geographical, social, and agricultural entity with special characteristics dissimilar from those across the border which require specialised and separate treatment. The Council of Agriculture for Wales believes that "the whole structure of agriculture in the Principality stands or falls on the prosperity of its livestock industry." It believes, too, that centres for research in animal husbandry should be established so that the Welsh farmer may have at his disposal the best knowledge which is available. Nor would the institution of a faculty of veterinary science benefit merely the production of cattle. It would also by its contributions to the knowledge of the treatment of hides and skins, and the other materials derived from the animal body, help in the revival and continuance of those rural industries which now are awaiting the support of new knowledge and new methods. In short a faculty of veterinary science in the University, if based upon its medical school, would aid not only Welsh agriculture but the rural industries dependent upon it and now sorely needing help. There is at Cardiff the National School of Medicine and there are there also facilities for meat inspection. As the University Council have reported, if a department or better a faculty of veterinary science were established in the University of Wales it is clear such a school should be set up at Cardiff. This is the generally accepted plan and the decision of the University Council is awaited with interest.

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At a representative meeting of county and county borough authorities held recently in Cardiff it was stated that the National Farmers' Union had decided to give support to the project for a Welsh Veterinary College. Professor Share Jones presided and it was decided to ask the Council of the Welsh University to define its attitude towards the scheme. An early meeting is to be sought with the Welsh Parliamentary Party for discussions on the appropriate steps to be taken to bring the veterinary college proposal before the Government.

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IMPORTS OF CATTLE FROM EIRE

Eire's export of cattle and horses is increasing every month. The value of store cattle exported to Britain in July was £1,149,893 or £308,000 greater than the July, 1944, figure. Fat cattle exports rose by almost 200 per cent.—from £20,716 in July, 1944, to £60,070 in the same month this year. Sheep and lambs were up by £6,700. The export of horses also shows a big jump—the figures for July of this year being £106,571 as against £15,267 for the corresponding month last year.

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WEEKLY WISDOM

"*. . . If you wish to find out quickly whereat the newly qualified veterinarian is likely to shape best, leave him with your child and your dog. If both take to him, turn him to general practice: he will be wasted elsewhere. If neither take to him, turn him to 'administration': he may prove to be a striking success, for he will be sufficiently impersonal. If only the one or the other takes to him, and then rather indifferently, there is still hope that he may excel in some of the pursuits that are now open to him: try him in laboratory research; for, through lack of an expansive humanity, he may have unusual powers of narrowing his mind to examining minutely in his lifetime a few objects. . . .*"—ANON.

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal views of the writer only and must not be taken as expressing the opinion or having received the approval of the N.V.M.A.

Letters to the Editor should reach the Office not later than by the first post on Monday morning for insertion in following Saturday's issue.

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"PELVIC FRACTURE IN STILBOESTROL-TREATED COWS"

Sir,—In *The Veterinary Record* for August 25th there is an abstract of an article on fracture of the pelvis in cows treated with stilboestrol implantation. As they very often become violent in behaviour after this treatment surely these fractures could easily occur when the beasts mount each other? This seems a much simpler and more feasible explanation than chemical alteration in the bones, as it occurs in bulling animals which have not been treated.

Yours faithfully,

Morven, Ilkley, Yorks. MARY I. HEARDER.
August 29th, 1945.